

IN THE CLAIMS:

The text of all pending claims, (including withdrawn claims) is set forth below. Cancelled and not entered claims are indicated with claim number and status only. The claims as listed below show added text with underlining and deleted text with ~~striketrough~~. The status of each claim is indicated with one of (original), (currently amended), (cancelled), (withdrawn), (new), (previously presented), or (not entered).

Please AMEND claims 1, 4-7, 12, and 14-41 in accordance with the following:

1. (CURRENTLY AMENDED) A method of simulating an operation of a logical unit, comprising:
requesting a resource ~~requesting step~~ in which a thread manager, which controls threads each forming an execution unit of a program, makes a request for a hardware resource needed for execution of each of threads representative of a series of functions required until the operation of said logical unit reaches completion according to a design specification of said logical unit, to a resource manager which manages said hardware resource;
allocating a resource ~~allocating step~~ in which said resource manager allocates said hardware resource meeting said request to said thread in accordance with a rule prescribed in advance; and
controlling a thread ~~control step~~ in which said thread manager controls an execution state of said thread in accordance with a result of the allocation made by said resource manager, said thread manager and said resource manager executing said ~~steps~~ requesting, allocating, and controlling repeatedly in cooperation with each other until the execution of said thread reaches completion while dynamically allocating necessary hardware resources to the thread by said resource manager every time the generated thread is executed, ~~for~~ simulating the operation of said logical unit to be conducted up to the completion.
2. (ORIGINAL) A method of simulating an operation of a logical unit according to claim 1, wherein said series of functions are represented in a plurality of sequential threads.
3. (ORIGINAL) A method of simulating an operation of a logical unit according to claim 1, wherein said series of functions are represented in a plurality of sequential or concurrently executed threads.
4. (CURRENTLY AMENDED) A method of simulating an operation of a logical unit

according to claim 1, wherein a plurality of resource managers each corresponding to said resource manager are provided in conjunction with the types of said hardware resources, and in said allocating a resource allocating step, each of said resource managers allocates said hardware resource, said resource manager manages, to said thread in accordance with a local rule described in advance.

5. (CURRENTLY AMENDED) A method of simulating an operation of a logical unit according to claim 1, wherein a plurality of resource managers each corresponding to said resource manager are provided in conjunction with the types of said hardware resources and are hierarchized according to the dependence among said hardware resources, and in said resource allocating step, the hardware resource allocation is made in consideration of the dependence between said hardware resource managed by one of said resource managers ~~manages~~ and said hardware resource managed by the other resource manager lower in hierarchy than the one of said resource managers.

6. (CURRENTLY AMENDED) A method of simulating an operation of a logical unit according to claim 1, wherein said resource manager monitors resource requests in said requesting a resource requesting step to make a decision on a resource request deadlock state among a plurality of threads on a result of the monitoring.

7. (CURRENTLY AMENDED) A method of simulating an operation of a logical unit according to claim 1, wherein said resource manager monitors read/write requests with respect to said hardware resource allocated by said resource request in said requesting a resource requesting step to make a decision on a competition state in read/write operation on said hardware resource among a plurality of threads on the basis of a result of the monitoring.

8. (ORIGINAL) A method of simulating an operation of a logical unit according to claim 1, wherein said resource manager monitors the number of resource requests with respect to said hardware resource to detect a bottleneck on said thread on the basis of a result of the monitoring.

9. (ORIGINAL) A method of simulating an operation of a logical unit according to claim 1, wherein said resource manager monitors the number of resource requests with respect to said hardware resource to detect blocking of said resource requests on the basis of a result of

the monitoring.

10. (ORIGINAL) A method of simulating an operation of a logical unit according to claim 1, wherein said thread has a budget on a time of occupancy of a hardware resource allocated by said resource manager.

11. (ORIGINAL) A method of simulating an operation of a logical unit according to claim 1, wherein said thread has an execution time-limit on said function.

12. (CURRENTLY AMENDED) A method of simulating an operation of a logical unit, comprising:

requesting a resource ~~requesting step~~ in which a thread manager, which controls threads each forming an execution unit of a program, makes a request for a hardware resource needed for execution of each of a series of threads representative of functions required until the operation of said logical unit reaches completion according to a design specification of said logical unit, to a resource manager which manages said hardware resource;

allocating a resource ~~allocating step~~ in which said resource manager allocates said hardware resource meeting said request to said thread in accordance with a rule prescribed in advance;

controlling a thread ~~control step~~ in which said thread manager controls an execution state of said thread in accordance with a result of the allocation made by said resource manager,

with said thread manager and said resource manager executing said steps requesting, allocating, and controlling repeatedly in cooperation with each other until the execution of said thread reaches completion while dynamically allocating necessary hardware resources to the thread by said resource manager every time the generated thread is executed, for simulating the operation of said logical unit to be conducted up to the completion;

~~said method further comprising:~~

~~a comparison step of~~ comparing a result of the simulation with an estimated value on said operation of said logical unit; and

~~an output step of~~ outputting a result of the comparison in ~~said comparison step~~ to an external unit.

13. (ORIGINAL) An apparatus for simulating an operation of a logical unit, comprising:

- a thread manager for controlling a thread forming an execution unit of a program; and
- a resource manager for managing a hardware resource needed for execution of said thread,

said thread manager including:

- resource requesting means for making a request for a hardware resource needed for execution of a thread representative of functions required until the operation of said logical unit reaches completion according to a design specification of said logical unit, to said resource manager; and
- thread control means for controlling an execution state of said thread in accordance with a result of a resource allocation made by said resource manager in response to the request from said resource requesting means,

said resource manager including:

- resource allocating means for allocating a hardware resource meeting the request to said thread in accordance with a rule prescribed in advance,

said thread manager and said resource manager conducting the resource request and the control of the thread execution state repeatedly in cooperation with each other until the execution of said thread reaches completion, for simulating the operation of said logical unit to be conducted up to the completion.

14. (CURRENTLY AMENDED) A computer-readable recording medium ~~retaining~~ storing a program for simulation of an operation of a logical unit, the program comprising computer instructions which when executed on a computer makes the said simulation program ~~making~~ a computer function as a thread manager for controlling threads each forming an execution unit of said program and as a resource manager for managing a hardware resource needed for execution of each of threads, ~~and said simulation program executing, by:~~

- requesting a resource ~~requesting step~~ in which said thread manager makes a request for a hardware resource needed for execution of threads representative of a series of functions required until the operation of said logical unit reaches completion according to a design specification of said logical unit, to said resource manager;
- allocating a resource ~~allocating step~~ in which said resource manager allocates said hardware resource meeting the request to said thread in accordance with a rule prescribed in advance; and

controlling a thread control step in which said thread manager controls an execution state of said thread in accordance with a result of the allocation made by said resource manager, said thread manager and said resource manager executing said steps the requesting, the allocating, and the controlling repeatedly in cooperation with each other until the execution of said thread reaches completion while dynamically allocating necessary hardware resources to the thread by said resource manager every time the generated thread is executed, for simulating the operation of said logical unit to be conducted up to the completion.

15. (CURRENTLY AMENDED) The A computer-readable recording medium retaining storing a computer-readable program for simulation of an operation of a logical unit according to claim 14, wherein a plurality of resource managers each corresponding to said resource manager are provided in conjunction with the types of hardware resources, and in said resource allocating step, each of said resource managers allocates said hardware resource, said resource manager manages, to said thread in accordance with a local rule described in advance.

16. (CURRENTLY AMENDED) The A computer-readable recording medium retaining storing a computer-readable program for simulation of an operation of a logical unit according to claim 14, wherein a plurality of resource managers each corresponding to said resource manager are provided in conjunction with the types of hardware resources and are hierarchized according to the dependence among said hardware resources, and in said resource allocating step, the hardware resource allocation is made in consideration of the dependence between said hardware resource managed by one of said resource managers and said hardware resource managed by the other resource manager lower in hierarchy than the one of said resource managers.

17. (CURRENTLY AMENDED) The A computer-readable recording medium retaining storing a computer-readable program for simulation of an operation of a logical unit according to claim 14, wherein said resource manager monitors resource requests in said resource requesting step to make a decision on a resource request deadlock state among a plurality of threads on a result of the monitoring.

18. (CURRENTLY AMENDED) The A computer-readable recording medium retaining storing a computer-readable program for simulation of an operation of a logical unit according to

claim 14, wherein said resource manager monitors read/write requests with respect to said hardware resource allocated by said resource request in said resource requesting step to make a decision on a competition state in read/write operation on said hardware resource among a plurality of threads on the basis of a result of the monitoring.

19. (CURRENTLY AMENDED) ~~The A computer-readable recording medium retaining storing a computer-readable program for simulation of an operation of a logical unit~~ according to claim 14, wherein said resource manager monitors the number of resource requests with respect to said hardware resource to detect a bottleneck on said thread on the basis of a result of the monitoring.

20. (CURRENTLY AMENDED) ~~The A computer-readable recording medium retaining storing a computer-readable program for simulation of an operation of a logical unit~~ according to claim 14, wherein said resource manager monitors the number of resource requests with respect to said hardware resource to detect blocking of said resource requests on the basis of a result of the monitoring.

21. (CURRENTLY AMENDED) ~~The A computer-readable recording medium retaining storing a computer-readable program for simulation of an operation of a logical unit~~ according to claim 14, wherein said thread has a budget on a time of occupancy of a hardware resource allocated by said resource manager.

22. (CURRENTLY AMENDED) ~~The A computer-readable recording medium retaining storing a computer-readable program for simulation of an operation of a logical unit~~ according to claim 14, wherein said thread has an execution time-limit on said function.

23. (CURRENTLY AMENDED) ~~The A computer-readable recording medium retaining storing a computer-readable program for simulation of an operation of a logical unit~~ according to claim 14, wherein said series of functions are represented in a plurality of sequential threads.

24. (CURRENTLY AMENDED) ~~The A computer-readable recording medium retaining storing a computer-readable program for simulation of an operation of a logical unit~~ according to claim 23, wherein a plurality of resource managers each corresponding to said resource manager are provided in conjunction with the types of hardware resources, and in said resource

allocating ~~step~~, each of said resource managers allocates said hardware resource, said resource manager manages, to said thread in accordance with a local rule described in advance.

25. (CURRENTLY AMENDED) The A computer-readable recording medium retaining storing a computer-readable program for simulation of an operation of a logical unit according to claim 23, wherein a plurality of resource managers each corresponding to said resource manager are provided in conjunction with the types of hardware resources and are hierarchized according to the dependence among said hardware resources, and in said resource allocating ~~step~~, the hardware resource allocation is made in consideration of the dependence between said hardware resource managed by one of said resource managers and said hardware resource managed by the other resource manager lower in hierarchy than the one of said resource managers.

26. (CURRENTLY AMENDED) The A computer-readable recording medium retaining storing a computer-readable program for simulation of an operation of a logical unit according to claim 23, wherein said resource manager monitors resource requests in said resource requesting ~~step~~ to make a decision on a resource request deadlock state among a plurality of threads on a result of the monitoring.

27. (CURRENTLY AMENDED) The A computer-readable recording medium retaining storing a computer-readable program for simulation of an operation of a logical unit according to claim 23, wherein said resource manager monitors read/write requests with respect to said hardware resource allocated by said resource request in said resource requesting ~~step~~ to make a decision on a competition state in read/write operation on said hardware resource among a plurality of threads on the basis of a result of the monitoring.

28. (CURRENTLY AMENDED) The A computer-readable recording medium retaining storing a computer-readable program for simulation of an operation of a logical unit according to claim 23, wherein said resource manager monitors the number of resource requests with respect to said hardware resource to detect a bottleneck on said thread on the basis of a result of the monitoring.

29. (CURRENTLY AMENDED) The A computer-readable recording medium retaining

~~storing a computer-readable program for simulation of an operation of a logical unit~~ according to claim 23, wherein said resource manager monitors the number of resource requests with respect to said hardware resource to detect blocking of said resource requests on the basis of a result of the monitoring.

30. (CURRENTLY AMENDED) ~~The A computer-readable recording medium retaining storing a computer-readable program for simulation of an operation of a logical unit~~ according to claim 23, wherein said thread has a budget on a time of occupancy of a hardware resource allocated by said resource manager.

31. (CURRENTLY AMENDED) ~~The A computer-readable recording medium retaining storing a computer-readable program for simulation of an operation of a logical unit~~ according to claim 23, wherein said thread has an execution time-limit on said function.

32. (CURRENTLY AMENDED) ~~The A computer-readable recording medium retaining storing a computer-readable program for simulation of an operation of a logical unit~~ according to claim 14, wherein said series of functions are represented in a plurality of sequential or concurrently executed threads.

33. (CURRENTLY AMENDED) ~~The A computer-readable recording medium retaining storing a computer-readable program for simulation of an operation of a logical unit~~ according to claim 32, wherein a plurality of resource managers each corresponding to said resource manager are provided in conjunction with the types of hardware resources, and in said resource allocating step, each of said resource managers allocates said hardware resource, said resource manager manages, to said thread in accordance with a local rule described in advance.

34. (CURRENTLY AMENDED) ~~The A computer-readable recording medium retaining storing a computer-readable program for simulation of an operation of a logical unit~~ according to claim 32, wherein a plurality of resource managers each corresponding to said resource manager are provided in conjunction with the types of hardware resources and are hierarchized according to the dependence among said hardware resources, and in said resource allocating step, the hardware resource allocation is made in consideration of the dependence between said hardware resource managed by one of said resource managers and said hardware

resource managed by the other resource manager lower in hierarchy than the one of said resource managers.

35. (CURRENTLY AMENDED) The A computer-readable recording medium retaining storing a computer-readable program for simulation of an operation of a logical unit according to claim 32, wherein said resource manager monitors resource requests in said resource requesting step to make a decision on a resource request deadlock state among a plurality of threads on a result of the monitoring.

36. (CURRENTLY AMENDED) The A computer-readable recording medium retaining storing a computer-readable program for simulation of an operation of a logical unit according to claim 32, wherein said resource manager monitors read/write requests with respect to said hardware resource allocated by said resource request in said resource requesting step to make a decision on a competition state in read/write operation on said hardware resource among a plurality of threads on the basis of a result of the monitoring.

37. (CURRENTLY AMENDED) The A computer-readable recording medium retaining storing a computer-readable program for simulation of an operation of a logical unit according to claim 32, wherein said resource manager monitors the number of resource requests with respect to said hardware resource to detect a bottleneck on said thread on the basis of a result of the monitoring.

38. (CURRENTLY AMENDED) The A computer-readable recording medium retaining storing a computer-readable program for simulation of an operation of a logical unit according to claim 32, wherein said resource manager monitors the number of resource requests with respect to said hardware resource to detect blocking of said resource requests on the basis of a result of the monitoring.

39. (CURRENTLY AMENDED) The A computer-readable recording medium retaining storing a computer-readable program for simulation of an operation of a logical unit according to claim 32, wherein said thread has a budget on a time of occupancy of a hardware resource allocated by said resource manager.

40. (CURRENTLY AMENDED) The A computer-readable recording medium retaining

storing a computer-readable program for simulation of an operation of a logical unit according to claim 32, wherein said thread has an execution time-limit on said function.

41. (CURRENTLY AMENDED) A computer readable ~~recording medium~~ storing a computer-readable ~~retaining a program~~ for simulation of an operation of a logical unit, the program comprising computer instructions which when executed on a computer makes the said simulation program making a computer execute:

requesting a resource ~~requesting step~~ in which a thread manager, which controls threads each forming an execution unit of a program, makes a request for a hardware resource needed for execution of each of threads representative of functions required until the operation of said logical unit reaches completion according to a design specification of said logical unit, to a resource manager which manages said hardware resource;

allocating a resource ~~allocating step~~ in which said resource manager allocates said hardware resource meeting said request to said thread in accordance with a rule prescribed in advance;

controlling a thread ~~control step~~ in which said thread manager controls an execution state of said thread in accordance with a result of the allocation made by said resource manager,

said thread manager and said resource manager executing the requesting, the allocating, and the controlling ~~said steps~~ repeatedly in cooperation with each other until the execution of said thread reaches completion while dynamically allocating necessary hardware resources to the thread by said resource manager every time the generated thread is executed, ~~for simulating the operation of said logical unit to be conducted up to the completion, and;~~

~~said method further comprising:~~

~~a comparison step of comparing a result of the simulation with an estimated value on said operation of said logical unit; and~~

~~an output step of outputting a result of the comparison in said comparison step to an external unit.~~